WHAT IS CLAIMED IS:

1. A method for determining velocity of a single elongated polymer, said method comprising measuring a plurality of signal amplitude profiles of said elongated polymer, each signal amplitude profile comprising measurements taken at a different one of a plurality of detection zones, and determining said velocity of said elongated polymer from said plurality of signal amplitude profiles, wherein each said signal amplitude profile comprises measurements in the respective detection zone of a signal generated at said single elongated polymer at a plurality of times, said plurality of times comprising times that are before and after said elongated polymer is in said detection zone, wherein said plurality of detection zones are located in order along the path of said elongated polymer at predetermined distances, and wherein said plurality of signal amplitude profiles are measured in a time-correlated manner.

2. The method of claim 1, wherein said plurality of detection zones consists of a first and a second detection zone and said plurality of signal amplitude profiles consists of a first signal amplitude profile comprising measurements taken at said first detection zone and a second signal amplitude profile comprising measurements taken at said second detection zone.

3. The method of claim 2, wherein said velocity of said single elongated polymer is a center-of-mass velocity and wherein said determining said velocity comprises

(a) determining temporal location of a first center-of-mass in said first signal amplitude profile and temporal location of a second center-of-mass in said second signal amplitude profile; and

(b) calculating said center-of-mass velocity by dividing distance between said first and second detection zones with difference between temporal locations of said first center-of-mass and said second center-of-mass.

4. The method of claim 2, wherein said velocity of said single elongated polymer is a center-to-center velocity and wherein said determining said velocity comprises

(a) determining temporal location of a first center of polymer contour in said first signal amplitude profile and temporal location of a second center of polymer contour in said second signal amplitude profile; and

(b) calculating said center-to-center velocity by dividing distance between said first and second detection zones with difference between temporal locations of said first center of polymer contour and said second center of polymer contour.

5. The method of claim 2, wherein said velocity of said single elongated polymer is an end-to-end velocity and wherein said determining said velocity comprises

(a) determining temporal location of a first leading end in said first signal amplitude profile and temporal location of a second leading end in said second signal amplitude profile; and

(b) calculating said end-to-end velocity by dividing distance between said first and second detection zones with difference between temporal locations of said first leading end and said second leading end.

6. The method of claim 5, wherein said temporal location of said first leading end and said temporal location of said second leading end are identified as the times at half heights of the respective leading edges in said first and second signal amplitude profiles.

7. The method of claim 2, wherein said velocity of said single elongated polymer is a rise-time velocity and wherein said determining said velocity comprises

(a) determining time interval of rising edge of said first or second signal amplitude profile measured in a respective detection zone; and

(b) calculating said rise-time velocity by dividing dimension of said respective detection zone with said time interval of rising edge of said first or second signal amplitude profile.

8. A method for determining the length of a single elongated polymer, said method comprising:

(a) measuring a first signal amplitude profile of said single elongated polymer at a first detection zone;

(b) measuring a second signal amplitude profile of said single elongated polymer at a second detection zone;

(c) determining a velocity of said single elongated polymer at said first and second detection zones from said first and/or second signal amplitude profiles; and

(d) determining length of said single elongated polymer by multiplying time difference between leading and trailing edges of said first or said second signal amplitude profile with said velocity;

wherein each said signal amplitude profile comprises measurements in the respective detection zone of a signal generated at said single elongated polymer at a plurality of times, said plurality of times comprising times that are before and after said elongated polymer is in said detection zone, wherein said plurality of detection zones are located in order along

the path of said elongated polymer at predetermined distances, and wherein said first and second signal amplitude profiles are measured in a time-correlated manner.

9. The method of claim 8, wherein said velocity of said single elongated polymer is a center-of-mass velocity and wherein said determining a velocity comprises

(a) determining temporal location of a first center-of-mass in said first signal amplitude profile and temporal location of a second center-of-mass in said second signal amplitude profile; and

(b) calculating said center-of-mass velocity by dividing distance between said first and second detection zones with difference between temporal locations of said first center-of-mass and said second center-of-mass.

10. The method of claim 8, wherein said velocity of said single elongated polymer is a center-to-center velocity and wherein said determining a velocity comprises

(a) determining temporal location of a first center of polymer contour in said first signal amplitude profile and temporal location of a second center of polymer contour in said second signal amplitude profile; and

(b) calculating said center-to-center velocity by dividing distance between said first and second detection zones with difference between temporal locations of said first center of polymer contour and said second center of polymer contour.

11. The method of claim 8, wherein said velocity of said single elongated polymer is an end-to-end velocity and wherein said determining a velocity comprises

(a) determining temporal location of a first leading end in said first signal amplitude profile and temporal location of a second leading end in said second signal amplitude profile; and

(b) calculating said end-to-end velocity by dividing distance between said first and second detection zones with difference between temporal locations of said first leading end and said second leading end.

12. The method of claim 11, wherein said temporal location of said first leading end and said temporal location of said second leading end are identified as the times at half heights of the respective leading edges in said first and second signal amplitude profiles.

13. A method for determining a distance between a first and a second landmark on an elongated polymer, said method comprising:

(a) detecting at a first detection zone said first and second landmarks on said elongated polymer;

(b) detecting at a second detection zone said first and second landmark on said elongated polymer;

(c) determining the velocity of said elongated polymer by dividing the distance between said first and second detection zones with time interval between detection of said first or second landmark in said first detection zone and detection of said first and second landmark in said second detection zone; and

(d) determining said distance between said first and second landmark by multiplying time interval between detection of said first and second landmark at said first detection zone or said second detection zone;

wherein said first and second detection zones are located in order along the path of said elongated polymer at predetermined distances, and wherein said detection in said first and said second detection zones are carried out in a time-correlated manner.

14. The method of claim 1, wherein said elongated polymer is an elongated DNA molecule.

15. The method of claim 8, wherein said elongated polymer is an elongated DNA molecule.

16. The method of claim 13, wherein said elongated polymer is an elongated DNA molecule.

17. The method of claim 1, wherein said measuring is performed by a method comprising measuring fluorescence intensity.

18. The method of claim 8, wherein said measuring is performed by a method comprising measuring fluorescence intensity.

19. The method of claim 13, wherein said first and second landmarks on said elongated polymer are labeled respectively with a first and a second fluorescence label and said detection comprising detecting of fluorescence of said first and second fluorescence labels.

20. The method of claim 13, wherein said first and second fluorescence labels have different and distinguishable fluorescence wavelengths.